Ex-Ante Evaluation (for Japanese ODA Loan)

Southeast Asia Division 4, Southeast Asia and Pacific Department,

Japan International Cooperation Agency (JICA)

1. Basic Information

Country: The Republic of the Union of Myanmar

Project: Urban Area Power Distribution Improvement Project

Loan Agreement: January 21, 2020

2. Background and Necessity of the Project

(1) Current State and Issues of the Development of the Electric Power Sector in Myanmar and the Positioning of the Project

The Republic of the Union of Myanmar ("Myanmar") has increased rapid growth in power demand due to recent advances in development and investment. In particular, the power demand is highest during the hot season (March to May), and the maximum power demand was recorded at about 3,075 MW nationwide in mid-May of 2017. In the "National Electricity Master Plan (draft)" developed with the support of JICA under "The Project for Formulation of the National Electricity Plan", the power demand is expected to increase to 4,531 MW (high case) in 2020, and power supply increase is planned accordingly.

However, due to delayed upgrades and improvements of power distribution facilities, transmission and distribution losses nationwide are 20% as of FY2014 (World Bank estimate: the same applies hereinafter), which is still higher than other ASEAN countries (Thailand: 6%, Vietnam: 9%, and Indonesia: 9%, etc.). The transmission and distribution losses in the Yangon and Mandalay regions, including the first and second biggest commercial cities in Myanmar, targeted by the Project, are also as high as 15.41% (Yangon region) and 14.70% (Mandalay region) as of FY2017. The operating rate of distribution substations also remains high, and it is expected that there will be many substations whose operating rate exceeds 100% in 2022. In the future, depending on the power demand, even if a power plant is constructed and transmission lines are upgraded, stable power supply will be hindered without improvement of the distribution losses, suspended operation of transformers, etc. For this reason, Myanmar must urgently improve and upgrade its distribution facilities.

Under such circumstances, Myanmar's "National Energy Policy" (2014) gives priority to increasing power generation, transmission, and distribution capacities to achieve sustainable economic development and reduce poverty. The economic policy announced by the current administration (July 2017) also prioritizes the "swift development of

basic economic infrastructures, such as power supply, roads, and ports." Myanmar's government considers the development of power supply infrastructures to be an important challenge. The Urban Area Power Distribution Improvement Project (hereinafter referred to as the "Project"), which aims to improve and upgrade the distribution networks in major cities of Myanmar (Yangon region and Mandalay region), thus supports these policies of Myanmar's government.

(2) Japan and JICA's Cooperation Policy, etc. in the Electric Power Sector and the Positioning of the Project

In the "Japan's Projected Economic Cooperation to the Republic of the Union of Myanmar" established in April 2012, "Assistance for development of infrastructure and related systems necessary for sustainable economic growth" is positioned as a priority field, which includes the Project contributing to sustainable economic growth by improving power supply in the Yangon and Mandalay regions. Also, "Energy cooperation to enable industrial development" is one of the pillars of the "Japan-Myanmar Cooperation Program" agreed upon between the Japanese and Myanmar Governments in November 2016. Furthermore, the Project is consistent with these cooperation policies agreed upon between Myanmar State Counsellor Aung San Suu Kyi and Japan's Prime Minister Abe in the meeting held in November 2017, focusing on accelerating specific cooperation in the field of "Electricity." Since the Project is considered to help achieve Sustainable Development Goal 7 — Ensure access to affordable, reliable, sustainable, and modern energy for all — by contributing to sustainable economic growth through power supply improvement in the Yangon and Mandalay regions, JICA's assistance for the Project is highly necessary.

(3) Other Donors' Activities

The Asian Development Bank (ADB) has helped Myanmar to formulate the "Myanmar Energy Master Plan" (officially announced in January 2016) and carried out the "Power Distribution Improvement Project" in Yangon, Mandalay, Sagaing, and other regions since January 2014 (US$60 million). For both of these projects, JICA has already confirmed with the executing agencies that there is no overlap in the target areas with the Project. Also, the World Bank (WB) has helped the country to formulate the "National Electrification Plan" and carried out the "National Electrification Project" nationwide since 2015 (US$400 million).

3. Project Description

(1) Project Objective

The objective of the Project is to improve power supply by repairing and reinforcing

distribution facilities in Yangon region and Mandalay region, thereby contributing to economic development and improvement of living standards in Myanmar.

(2) Project Site/Target Area

Yangon region/Mandalay region

(3) Project Components

i. Construction and Reinforcement of
   - 66/11 kV and 33/11 kV Substations
   - 66 kV Transmission Lines and 33 kV Distribution Lines

ii. Construction and Reinforcement of
   - 11 kV Distribution Lines
   - 11/0.4 kV Distribution Transformers
   - 400V Distribution Lines

iii. Procurement of Utility Vehicles

iv. Consulting Services (Basic Design, Tender Assistance, Construction Supervision, Environmental and Social Considerations, etc.)

(4) Estimated Project Cost

13,819 million yen (including an ODA loan of 12,288 million yen)

(5) Project Implementation Schedule

From January 2020 to June 2026 (78 months in total) provided that the project is considered to be completed when the substations are placed in service in May 2025.

(6) Project Implementation Structure

1) Borrower: The Government of the Republic of the Union of Myanmar

2) Guarantor: N/A

3) Executing Agencies: Yangon Electricity Supply Corporation (hereinafter referred to as the "YESC"), Ministry of Electricity and Energy (MOEE), and Mandalay Electricity Supply Corporation (hereinafter referred to as the "MESC")

4) Operation/Maintenance and Management Agencies: YESC and MESC

(7) Environmental and Social Considerations/Poverty Reduction/Social Development

1) Environmental and Social Considerations

i. Category: B

ii. Reason for Categorization: The Project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA Guidelines for Environmental and Social Consideration (April 2010), and its potential adverse impacts on the environment are not likely to be significant.

iii. Environmental Permit: Myanmar's laws do not require the preparation of an Environmental Impact Assessment (EIA) Report concerning the Project.

iv. Anti-Pollution Measures: Although the Project is expected to have adverse impacts on air quality, noise, vibration, and waste during construction work, as well as water quality, noise, vibration, soil, and waste after the start of service, such adverse impacts will be minimized by implementing mitigation measures, including maintenance of construction machinery, water sprinkling, work time restrictions, and disposal of waste according to the waste management plan meeting the country's domestic emission and environmental standards.

v. Natural Environment: Since the project sites are not in or near sensitive areas, such as national parks, the Project is considered to have minimal adverse impacts.

vi. Social Environment: The Project does not involve land acquisition or resident resettlement because it only improves and upgrades existing facilities within the ROW of national roads.

vii. Other/Monitoring: Contractors will monitor air quality, noise, vibration, waste, etc. during construction work and Executing Agencies will monitor noise, vibration, soil, waste, etc. after the start of service.

2) Cross-Cutting Issues

Since the Project will improve power losses by improving distribution networks, producing an effect equivalent to an increase in power generation, the Project is expected to contribute to climate change mitigation by reducing greenhouse gas emissions by about 25,705 tons of carbon dioxide equivalent per year.

3) Gender Classification

[Not applicable] GI (Gender Informed)

<Description of activities and reason for classification> Gender policies, activities from a gender perspective in similar projects, impacts by gender in the Project, etc. have been confirmed and discussed in the appraisal with the Myanmar government, however, specific efforts that would contribute to gender equality and women's empowerment have not been made.

(9) Other Important Issues

The Project will use technologies such as cubicle-type gas insulated switchgears (outdoor type) and utility vehicles.

4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

Indicator	YESC		MESC	
	Original (Actual value in 2016)	Target (2027) [Two years after the project completion]	Original (Actual value in 2016)	Target (2027) [Two years after the project completion]
Capacity of Installed Transformer (MVA)	3,026	3,626	625	1,025
Transformer Utilization Rate (%)	51	80	49	90
Electricity Supply (GWh/yr) (*1)	0	6,892	0	2,486
System Average Interruption Frequency Index (instances/year) (*2)	N/A	0	N/A	0
System Average Interruption Duration Index (min/year) (*2)	N/A	0	N/A	0
Power Loss Rates (%) (*3)	15.41	14.41	14.70	13.70

(*1) The number is electricity supply from the substations installed by the Project.

(*2) Currently, this value cannot be calculated because data on consumers covered by distribution lines is not managed. Only the number of power outages resulting from accidents that occurred to the transmission lines and substation facilities that are installed in the Project is counted.

(*3) Only the Power Loss Rate are actual values in 2017.

(2) Qualitative Effects: Stable domestic power supply and promotion of economic and social development

(3) Internal Rate of Return

Based on the following assumptions, the Economic Internal Rate of Return (EIRR) of the Project is calculated to be 27.1% in YESC and 31.7% in MESC, and the Financial Internal Rate of Return (FIRR) is calculated to be 20.2% in YESC and 32.2% in MESC.

[EIRR]

Cost: Project Cost, and O&M Costs (all excluding tax)

Benefits: Increase in Electricity Supply, Decrease of Distribution Losses

Project life: 30 years

[FIRR]

Cost: Project cost, and O&M Costs

Benefits: Revenue from Increase in Electricity Supply, and Decrease of Distribution Losses

Project life: 30 years

5. Prerequisites and External Factors

(1) Prerequisites: None in particular

(2) External factors: None in particular

6. Lessons Learned from Past Projects and Application of Lessons Learned to the Project

According to the evaluation results, etc. of the ODA Loan "Colombo City Electricity Distribution Development Project" (evaluation year: 2014) for the Democratic Socialist Republic of Sri Lanka, regarding the procurement method, in the appraisal stage, it was planned that consultants would implement detailed design and contractors provide and install equipment. However, in the implementation stage, the "implementation of detailed design" was changed to "review of contractors design" in consulting services because it is common that bidders submit their detailed design drawings in the procurement of power generation and transformation related plants. As a result, this change required a lot of time for the paperwork, and we learned that the procurement method should be fully discussed with the executing agency in the appraisal stage.

In the Project, it has been agreed that the design build method (consultants implement basic design and contractors implement detailed design) is applied after fully discussing the substation facilities procurement method with the executing agency in the appraisal.

7 . Evaluation Results

The Project, which improves power supply by repairing and reinforcing distribution facilities in Yangon region and Mandalay region, is consistent with the country's development challenges and policies as well as Japan and JICA's aid policies. Also, since the Project contributes to the achievement of Sustainable Development Goal 7 — ensure access to affordable, reliable, sustainable, and modern energy for all — it is highly necessary for JICA to provide support for the implementation of the Project.

8. Plan for Future Evaluation

(1) Indicators to be Used

As provided in 4. (1) to (3).

(2) Next Evaluation Schedule

Ex-post evaluation: Two years after the project completion